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The life and work of Harvey Cushing 1869–1939: A pioneer of neurosurgery

Nancileigh M Doyle, James F Doyle and Edward J Walter

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Harvey Cushing is well known as being the father of modern neurological surgery and his portrait brands the American Association of Neurological Surgeons. He was the youngest of 10 children and from medical lineage with his father, grandfather and great-grandfather all being general medical practitioners. The details of his life and work are particularly well documented as a result of his obsessive letter writing and record keeping.

Early career

Dr Cushing began his medical career as an intern in 1895 at Massachusetts General Hospital (MGH) spending a year in the surgical service. An intern, as opposed to an extern, would live and work in the hospital for the year on minimal wage and for long hours. As an intern, Cushing wrote a letter to his mother: 'Everyone is much excited over the new photographic discovery . . . we won't be able to have secrets anymore', referring of course to the newly discovered technology of X-rays by the German physicist Röntgen. Within three months, Cushing had helped secure X-ray apparatus for the MGH out-patient department.

Cushing went on a fishing vacation in August of 1914, and by the end of this vacation, war had broken out. Cushing headed the first Harvard Unit of 13 surgeons and 4 nurses and left America on 22 March 1915 headed for Gibraltar and on to Paris where they ran the 'American Ambulance' before returning in June. Several further stints were spent in base hospitals during the subsequent war years, and he was eventually assigned as senior consultant in neurological surgery for the American Expeditionary Forces in Europe. During this time, he treated Lieutenant Edward Revere Osler, who had been fatally wounded during the third battle of Ypres, and was the son of Sir William Osler. Later, Cushing would write a two-volume biography of Sir William Osler, becoming a classic, and winning him a Pulitzer Prize in 1926.

By the end of the war, Cushing had been awarded Companion of the Bath by the British government, and the Distinguished Service Medal by the U.S. Army.

Neurosurgical career

Having established himself as a surgeon with an early interest in neurosurgery, Cushing was one of the very first advocates of the Riva-Rocci sphygmomanoter, in around 1900, as a means to measure peri-operative blood pressure. The device was effectively the earliest method of measuring blood pressure accurately, developed by an Italian paediatrician, Scipione Riva-Rocci, a few years previously. This new monitoring system was soon adopted, and coupled with the newer surgical techniques, allowed safer and more complex surgery to be undertaken.

Cushing was an innovator but not particularly inventive. As such, he repudiated the sets of 'Cushing's Brain Instruments' sold by Codman & Shurtleff during and after the war as unauthorized knock-offs.

Eponymous discoveries

Cushing's reflex came about from Harvey Cushing's studies of the brain's reaction to compression, whilst

Intensive Care Unit and Surrey Perioperative Anaesthesia & Critical Care Collaborative Research Group (SPACeR), Royal Surrey County Hospital NHS Foundation Trust, Guildford, UK

Corresponding author:
James F Doyle, Intensive Care Unit and Surrey Perioperative Anaesthesia & Critical Care Collaborative Research Group (SPACeR), Royal Surrey County Hospital NHS Foundation Trust, Egerton Road, Guildford, UK.
Email: james.doyle4@nhs.net

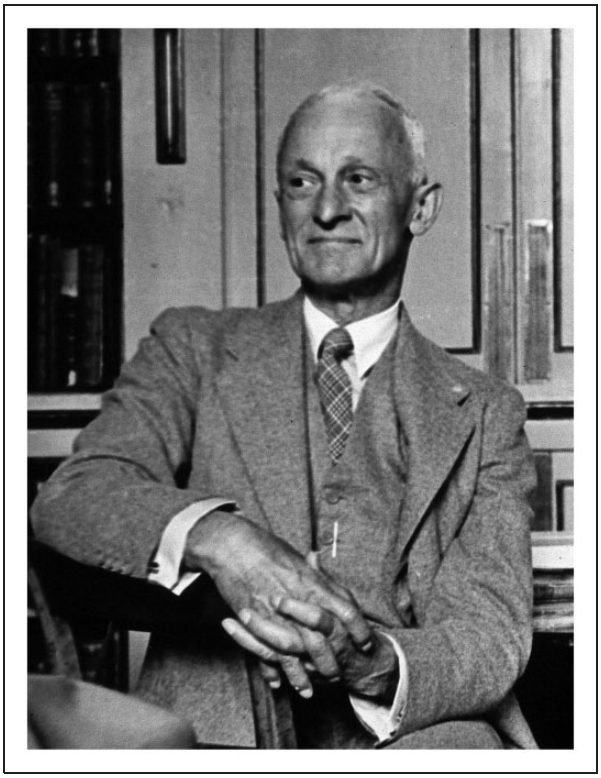

Figure 1. Harvey Cushing.

in Europe in 1901 and 1902. His studies were more detailed than those of other researchers; the brain's reaction had been known for the preceding 20 years, and even though Cushing's Law was not particularly original, Cushing was able to describe in detail the timings, stages and local variations of the observations associated with increased brain pressure and offer a much more detailed description of the pathophysiology of Cushing's reflex. His research showed that increased intracranial pressure leading to cerebral herniation and fatal brainstem compression resulted in increasing systolic and pulse pressure with bradycardia and respiratory irregularity; his detailed descriptions allowed the phenomenon to bear his name, rather than the previous researchers.

Perhaps his most enduring contribution to clinical medicine is Cushing Syndrome, described in 1932. It was Cushing himself who deftly realized the collective signs of a small series of patients whilst preparing the background reading for his 1930 Lister Lecture on pituitary physiology. This, for the first time, more completely explained other researchers' partial explanations, for example, the term 'diabetes of bearded women'. Cushing syndrome is the consequence of hypersecretion of the adrenal cortex due to any aetiology, although the original case series described three instances of pituitary basophilic adenomas.

Later life

Whilst suffering with his own health with vascular insufficiency of the lower legs, Cushing declined the offer of amputation and instead found that cessation of tobacco (he was an excessive smoker) hugely improved his health within three weeks. Whilst suffering lapses, he did subsequently lecture on the benefits of smoking cessation despite it being many years before the habit was medically denounced.

Cushing died in Connecticut, from complications of a myocardial infarction. Interestingly, as the pioneer of modern neurosurgical practice, his autopsy revealed a colloid cyst in the third ventricle.

His extraordinary medical career spanning over 40 years, including operating on over 2000 brain tumours, and his discoveries and innovations, have helped make Neurology and Neurosurgery the respected specialties they are now.

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